

Steve Kagan for The New York Times

"Mosaic is the first window into cyberspace," said Larry Smarr, right, director of the National Center for Supercomputing Applications in Champaign, Ill. With him is Joseph Hardin, associate director.

A Free and Simple Computer Link.

By JOHN MARKOFF

Special to The New York Times

SAN FRANCISCO, Dec. 7 — Think of it as a map to the buried treasures of the Information Age.

A new software program available free to companies and individuals is helping even novice computer users find their way around the global Internet, the network of networks that is rich in information but can be baffling to navigate.

Since its introduction earlier this year, the program, called Mosaic, has grown so popular that its use is causing data traffic jams on the Internet. That worries some computer scientists. But Mosaic's many passionate proponents hail it as the first "killer app" of network computing — an applications program so different and so obviously useful that it can create a new industry from scratch.

"Mosaic has given me a sense of limitless opportunity, which is the reason that I went into computer science in the first place," said Brian

Enormous stores of data are just a click away.

Reid, a computer researcher who is the director of the Digital Equipment Corporation's Network System's Laboratory in Palo Alto, Calif.

Digital, a leading computer maker, is exploring ways of using Mosaic as the basis for a whole new system of electronic commerce, letting customers easily browse through on-line product catalogues. Other companies — including Xerox, the software company Novell Inc. and the publisher R. R. Donnelley — are also exploring business opportunities they see springing from Mosaic. And in California, a government and private industry consortium called Smart Valley Inc. is using Mosaic to create an electronic marketplace for Silicon

Valley high-tech companies.

Before Mosaic, finding information on computer data bases scattered around the world required knowing — and accurately typing — arcane addresses and commands like "Telnet 192.100.81.100." Mosaic lets computer users simply click a mouse on words or images on their computer screens to summon text, sound and images from many of the hundreds of data bases on the Internet that have been configured to work with Mosaic.

Click the mouse: there's a NASA weather movie taken from a satellite high over the Pacific Ocean. A few more clicks, and one is reading a speech by President Clinton, as digitally stored at the University of Missouri. Click-click: a sampler of digital music recordings as compiled by MTV. Click again, et voilà: a small digital snapshot reveals whether a certain coffee pot in a computer science laboratory at Cambridge Uni-

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Consumer Install Debt Ju

Confidence Cheers Econ

By ROBERT D. H

Special to The New

WASHINGTON, Dec. 8 — Increasingly confident consumers are installing an unexpectedly large \$ of new installment debt this year than they paid off, the Federal Reserve shows.

Even though previous figures have shown a decline in sales of automotive goods during October, today that they were the degree to which consumers were willing to take on fre-

"It's a barometer of confidence," said Elliott, a realist at Donaldson, Loomis & Co., calling the Fed's report a precursor for the "The consumer's willingness to borrow again — and borrow

Mortgage Refinancing

The October increase in mortgage refinancing to be the biggest gain since 1988, except for a brief later that reflected temporary in compilation. A new survey of consumers' willingness to take on new debt, Mr. Platt says, shows that households have taken the lowest long-term interest rates in two decades to refinance, sometimes more than 10 percent, lowering their monthly payments.

A second report from the Mortgage Bankers Association showed mortgage delinquency fell to a 19-year low in the third quarter. All geographic areas showed improvement in all loan types and categories, the agency showed.

"With employment firming up across the country, people are struggling with mortgage payments, and executive vice president of the group, said.

Only 4.21 percent of mortgage payments were behind in the July and August period, a reversal following a quarter jump that had pushed the frequency rate to 4.39 percent.

The Mortgage Bankers Association found that 20 percent of

Free and Simple Link to Computer Network

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versity in England is empty or full.

Other data bases searchable with Mosaic include the card catalogues of the Library of Congress and hundreds of American and foreign university libraries, Federal Government archives, various NASA computers and the University of California at Berkeley paleontology museum. The French Government is also considering using Mosaic to display digitized versions of paintings and other art exhibits from its national galleries.

"Mosaic is the first window into cyberspace," said Larry Smarr, the director of the National Center for Supercomputing Applications in Champaign, Ill., where Mosaic was developed. The center in Champaign, which is one of the nation's four federally financed supercomputer research centers, is receiving more than 600,000 electronic information queries each week from Mosaic users.

Available free to Internet users willing to download it to their computers, Mosaic has been acquired by several hundred thousand computer networkers in less than a year, according to several industry estimates. The users include computer scientists, librarians, software developers, magazine publishers, record companies and catalogue distributors, all of whom see it as the first general-purpose navigational tool for the emerging data highway.

Helping Shape a Debate

So sudden and dramatic has been Mosaic's success in attracting commercial software developers that the program may play a decisive role in determining the shape of the national "information infrastructure" now being debated by Government officials and telecommunications and computer executives.

One evangelist for Mosaic is Mitch-

A scientists' tool will soon be put to commercial uses.

ell D. Kapor, founder of the Lotus Development Corporation, the company whose Lotus 1-2-3 spreadsheet helped ignite the personal computer revolution in the early 1980's. Mr. Kapor, who heads the Electronic Frontier Foundation, a public interest group on computer issues, visited a cable television industry show last week in Anaheim, Calif., and demonstrated Mosaic. He sees it as a tool in his crusade to cajole the telephone, cable television and computer industries to establish an open and accessible national data highway rather than a private toll road that many of the private companies seem to prefer.

"For me Mosaic was a turning point," Mr. Kapor said. "It's like -C-Span for everyone."

A Better Way to Browse

Mosaic was created by a small group of software developers and students at the supercomputer center in Champaign, who set out 18 months ago to create a system for browsing through the World-Wide Web. The Web is an international string of computer data bases that uses an information-retrieval architecture developed in 1989 by Tim Berners-Lee, a British computer specialist at the CERN physics laboratory in Geneva.

Mr. Berners-Lee's system originally permitted many of the world's high-energy physics researchers to exchange information represented in a form known as hypertext. With hypertext, highlighted key words and images are employed to point a user to related sources of information.

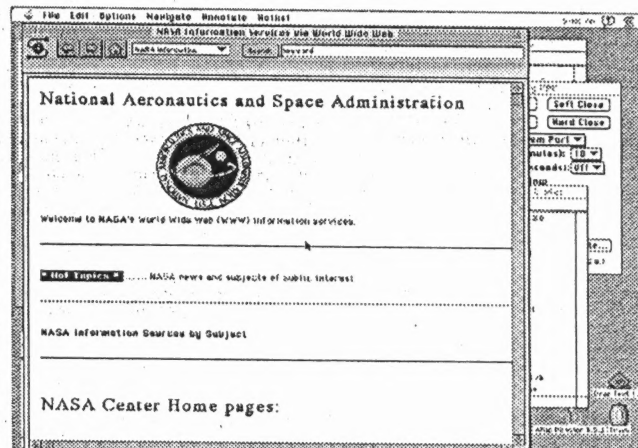
A Click of the Mouse, a World of Information

Using a computer and a mouse, a person can access a network of information known as the World-Wide Web to display an array of documents, data, sounds and images. The Web's information is carried over the global Internet system of computer networks.

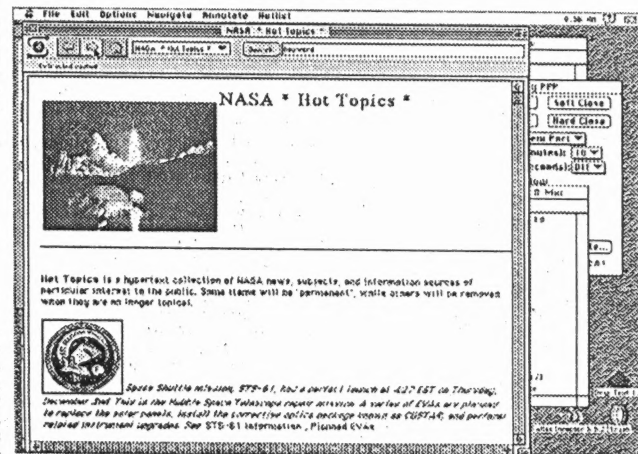
Navigating by use of on-screen highlighted words

or images called hot links or hyperlinks, a computer user can retrieve information related to the desired topic. For example, by clicking on the phrase "Hot Topics" in the first screen below, a person can access the second screen, containing the latest information about NASA's mission to repair the Hubble telescope.

1 What the Computer User Sees First



2 What the Computer User Sees Next



"I realized that if everyone had the same information as me, my life would be easier," Mr. Berners-Lee said.

From a small electronic community of physicists, the World-Wide Web has grown into an international system of data base "server" computers offering diverse information. The Web has also fundamentally changed the way information is obtained over the Internet. In the past it has been largely necessary to connect to a remote host computer using a complicated software program that fooled the computer into thinking the far-away visitor was using one of the host machine's own local terminals. But the Web simplifies things by using a networking model called client-server computing, which allows remote requests for information from any personal computer or work station.

"It's like the difference between the brain and the mind," Mr. Berners-Lee said. "Explore the Internet and you find cables and computers. Explore the Web and you find information."

Much of the Web data now available to Mosaic users is being made available by university researchers

who are constructing demonstration projects to explore the technology.

But commercial applications are being worked on by a wide range of corporate developers. Novell, the world's largest developer of computer network software, has organized its technical reference literature so that any computer network user can retrieve it. Such browsing represents a form of advertising that is noninvasive and that seems to fit well with the culture of the Internet, whose users tend to be easily infuriated by electronic junk mail.

"I'm convinced that very quickly we'll have a new Madison Avenue kind of industry devoted to this style of advertising," said Tony Rutkowski, an executive at the Sprint Corporation, one of the companies whose long-distance lines provide the backbone for the Internet.

Already, O'Reilly & Associates, a technical book publisher based in Sebastopol, Calif., has used Mosaic and the Web to create an on-line magazine that includes advertising.

There remain, however, significant barriers to using Mosaic. It requires that the user have a computer that is

In a document on the Web, highlighted words and images are imbedded with three pieces of information:

- the address of the "server," the computer that stores documents
- the document's address on the server
- the protocol, which is the language another computer must use to retrieve the document.

What the Computer Does

1 The Mosaic program, developed by the National Center for Supercomputing Applications, provides screens of starting points. When a hot link is clicked, the computer seeks a document, using the imbedded protocol.

The server finds the document and routes it to the computer that made the request.

2 Mosaic automatically displays the documents or images requested, opening programs for special types of data like music, if necessary.

How long this takes depends on the speed of the network and the size of the document. Smaller requests would appear instantaneously, while bigger ones like music and movies would take longer. A 100-page document can be retrieved in less than a minute.

Documents can also be located by searching for specific terms. The request will be transmitted to a server, which will deliver multiple documents, like all the White House press releases on a certain topic.

Other documents might be purchased by using a hot link to access a supplier's order form.

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